

# PATENT ABSTRACTS OF JAPAN

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(54) CONDUCTIVE FLOOR COMPOSITION AND CONDUCTIVE FLOORING MADE BY USING THE SAME

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a conductive floor coating compsn. which has stable antistatic properties, can be colored, and provides a glossy coating film excellent in smoothness and to provide a conductive flooring made by using the same.

SOLUTION: This compsn. comprises an epoxy resin, a conductive zinc oxide, carbon fibers, a colorant, a dispersant, an antifoaming agent, and a curative and contains 50-150 pts.wt. conductive zinc oxide having a particle size of 2-20 $\mu$ m, 0.5-6 pts.wt. carbon fibers having an average diameter of 10-20 $\mu$ m and an average length of 0.3-3mm, 0.1-5 pts.wt. polyester acid amideamine as the dispersant, and 0.1-5 pts.wt. specially modified vinyl polymer as the antifoaming agent based on 100 pts.wt. epoxy resin having an epoxy equivalent of 150-300.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the coating material constituent for conductive floors and the conductive flooring which are used for a clean room, a chip fabrication factory, a hospital operating room and other precision instruments, or a computer-related floor for the purpose of destaticization in more detail about a conductive floor application material constituent and conductive flooring.

[0002]

[Description of the Prior Art] in order to prevent the static electricity failure -- 109ohms or less -- it is supposed that there should just be resistance (105-109ohm are suitable especially) of a semiconductor region mostly. Conventionally, in order to give electrostatic tightness to flooring, the technique of mixing various electric conduction fillers in the coating material which forms an enveloping layer, and lowering resistance has been taken. As those conductive fillers, by the powder-like thing, conductive carbon black, graphite, a metallic oxide (tin oxide and zinc oxide), a metal powder (aluminum, copper, silver), etc. have a configuration, and there are a carbon fiber, a metal fiber, metal coat fiber, etc. by the fibrous thing. In addition, there are granular aluminum, a granular stainless grid, etc. (Reference, such as JP,2-2904,B and JP,2-61799,B) However, in which coating material for floors or flooring which gave the above conventional static-free engine performance, it was not what satisfies various properties.

[0003] First, the thing using a carbon system electric conduction filler with a black color tone has the fault which cannot colorize coating flooring, the thing using the electric conduction filler of a metal system has the fault from which conductivity changes with oxidation, and silver dust is expensive. Furthermore, the carbon fiber and the metal fiber had a problem also in dispersibility besides the above-mentioned fault. Next, there is a powdery metallic oxide as a white system electric conduction filler with easy colorization. However, in order to acquire conductivity with a powdery metallic oxide, it needed to add very in large quantities, and when little, it was not able to sediment within the paint film, and an insulating layer was not able to be made on a paint film front face, and conductivity was not able to be secured [ formation of electric conduction pass became impossible and ]. Furthermore, when it added in large quantities to a coating material, the mechanical physical properties of a coating material could not but fall to the degree of pole, and could not but grow into the coating material weak against generating of a crack, or an impact and a load.

[0004]

[Problem(s) to be Solved by the Invention] This invention aims at offering the coating material for conductive floors and the conductive flooring which solve the above troubles, and have the stable electrostatic prevention effectiveness, and can be colored.

[0005]

[Means for Solving the Problem] In the coating material constituent for conductive floors with which this invention consists of an epoxy resin, a conductive zinc oxide, a carbon fiber, a coloring agent, a dispersant, a defoaming agent, and a curing agent As opposed to the epoxy resin 100 weight section of weight per epoxy equivalent 150-300 The carbon fiber 0.5 whose average die length is the conductive zinc oxide 50 with a particle diameter of 2-20 micrometers - the 150 weight sections and whose average diameter is 0.3-3mm in 10-20 micrometers - 6 weight sections, It is related with the coating material constituent for conductive floors characterized by containing the AMAIDO amine system dispersant 0.1 of a polyester acid - 5 weight sections as a dispersant, and containing the defoaming agent 0.1 of a special denaturation vinyl system polymerization object - 5 weight sections as a defoaming agent, and the conductive flooring using it.

[0006] By mixing two kinds of conductive fillers, in order to give conductivity in this invention, if respectively independent, while conductivity is securable with the loadings from which sufficient resistance was not acquired, only by the carbon fiber, the coloring made impossible is attained and a paint film appearance is improved by using a further specific dispersant and a specific defoaming agent. as the epoxy resin used by this invention -- a glycidyl ether mold, a glycidyl ester mold, and a line -- although there are epoxy resins, such as an aliphatic series epoxide mold, the epoxy resin of weight per epoxy equivalent 150-300 is desirable.

[0007] The conductive zinc oxide used by this invention has that desirable whose particle diameter is 2-20 micrometers. In order for a less than 2-micrometer thing to acquire sufficient conductivity, it is necessary to make [ many ] loadings, and in the thing exceeding 20 micrometers, the stability of a coating material is bad and the surface smooth nature of a paint film also worsens. As for the loadings of a conductive zinc oxide, it is desirable that it is the 50 - 150 weight section to the epoxy resin 100 weight section. If a conductive zinc oxide exceeds the 150 weight sections, viscosity becomes high, workability worsens and under 50 weight sections are not enough as conductivity.

[0008] The carbon fiber used by this invention has that good whose average die length an average diameter is 0.3-3mm in 10-20 micrometers. If the carbon fiber which became inadequate [ conductivity ] when average die length used the less than 0.3mm thing, and exceeded 3mm is used, workability will fall and a paint film appearance will worsen. As for the loadings of a carbon fiber, it is desirable that it is 0.5 - 6 weight section to the epoxy resin 100 weight section. If a carbon fiber exceeds 6 weight sections, coloring will become difficult, viscosity becomes high, and workability worsens. Moreover, under the 0.5 weight sections are not enough as conductivity. As a coloring agent, titanium oxide, chromic oxide, red ocher, carbon black, etc. are illustrated.

[0009] The dispersant used by this invention can blend various well-known dispersants. For example, the salt of the long-chain amine salt of aliphatic series system polyvalent carboxylic acid, the amine salt of macromolecule polyester, a polyether ester mold anion system surface active agent, and the amount polycarboxylic acid of macromolecules, long-chain poly amino AMAIDO, and macromolecule polyester, the phosphate of long-chain poly amino AMAIDO, the AMAIDO amine salt of the amount polyester acid of macromolecules, etc. are mentioned. Especially the AMAIDO amine salt of the amount polyester acid of macromolecules secures the dispersibility of a carbon fiber effectively. As for loadings, it is desirable that it is 0.1 - 5 weight section to the epoxy resin 100 weight section. If the dispersion effect of under the 0.1 weight section is inadequate and 5 weight sections are exceeded, a paint film appearance will worsen.

[0010] The defoaming agent used by this invention can also blend various well-known defoaming agents. For example, a special acrylic polymerization object, a silicon mixing acrylic polymerization object, a special denaturation vinyl system polymerization object, the amount silicon of special macromolecules, etc. are mentioned. Especially a special denaturation vinyl system polymerization object is effective in removing the minute bubble of a paint film, and a paint film appearance becomes good. As for loadings, it is desirable that it is 0.1 - 5 weight section to the epoxy resin 100 weight section. If under the 0.1 weight section of the defoaming effectiveness is inadequate and 5 weight sections are exceeded, a paint film appearance will worsen.

[0011] Moreover, as a curing agent, a polyamide amine, aliphatic series and aromatic series polyamine, and also those denaturation objects are used. It is also possible to use a hardening accelerator if needed. As a hardening accelerator, tertiary amine, such as a phenols [ , such as a phenol and cresol ], N, and N'-dimethyl piperazine, 2 and 4, and 6-tris (dimethyl aminomethyl) phenol, can be mentioned. next, the front face of the floor base material although it is the manufacture means of the conductive flooring concerning this invention, after fully mixing the raw material of the aforementioned conductive coating material constituent or making it distribute -- flow coating and a trowel -- it applies by coating etc. and the approach of making it film-ize is taken. It is common to carry out on the occasion of spreading, so that thickness of coating may be set to 1-2mm.

[0012]

[Embodiment of the Invention] Hereafter, although an example explains this invention concretely, this invention is not limited only to the following examples. In addition, about evaluation of the obtained coating material, it was based on the following test method.

(a) a with a surface leakage resistance [ of 910x910x5mm ] slate plate -- a coating material -- 2kg -- a trowel -- coating -- applying -- the next day -- after hardening and NFPA -- it measured by law.

(b) The surface appearance of a paint film (macro-scopic observation)

(O) ->(\*\*) -> [ which is not worried ] [coloring nature] -- the black by the carbon fiber -- finishing -- worrisome (x)

[surface smooth nature] -- gloss -- it is -- smooth (O) ->(\*\*) -> -- lusterless -- those (x) with a feeling of ZARATSUKI

[Degassing nature] The extent (O) ->(\*\*) -> bubble with which a fine bubble remains remains, or a bubble bursts and a hole remains (x).

[dispersibility of a carbon fiber] -- homogeneity -- distributed (O) ->(\*\*) -> -- it gathers partially and a lump is conspicuous (x)

[0013]

[Example 1] the combination shown in Table 1 -- following -- the bisphenol A diglycidyl ether (the Asahi tibia company make --) of weight per epoxy equivalent 190 The Araldite AER260 100 weight section, the zinc-oxide (Hakusui chemistry company make-Z) 100 weight section with a mean particle diameter of 3-6 micrometers, Average die length of 0.7mm after mixing the color pigment 20 weight section for 15 minutes with a high-speed agitator, The carbon fiber (Osaka Gas Co., Ltd. make, DONAKABO S-244) 4 weight section with a diameter of 13 micrometers, The AMAIDO amine system dispersant (Kusumoto formation shrine make, Despa Ron (DA) 703-50) 2 weight section of a polyester acid and the defoaming agent (Kusumoto formation shrine make, Despa Ron P420) 2 weight section of a special denaturation vinyl system polymerization object were supplied, and it mixed for 5 minutes with the high-speed agitator. The denaturation aliphatic series polyamine (Dainippon Ink chemistry company make, lacquer enamel MAIDO WGA281) 40 weight section was mixed as a curing agent into this mixture, and the coating material constituent was obtained. The performance test result of the obtained paint film is shown in Table 2.

[0014]

[Example 2] As shown in Table 1, the zinc-oxide 80 weight section, the dispersant, and the defoaming agent were made into 3 weight sections, respectively, and the coating material constituent was obtained like the example 1 except having used the carbon fiber (Osaka Gas Co., Ltd. make, DONAKABO S-231) 5 weight section with an average die length [ of 3mm ], and a diameter of 13 micrometers. The performance test result of the obtained paint film is shown in Table 2.

[0015]

[Example 3] As shown in Table 1, the coating material constituent was obtained like the example 1 except having made the zinc oxide into the 120 weight sections, and having made the amount of carbon fibers, the amount of dispersants, and the amount of defoaming agents into one half. The performance test result of the obtained paint film is shown in Table 2.

[0016]

[The example 1 of a comparison] Only the carbon fiber was mixed by the same approach as an example 1 without adding a dispersant and a defoaming agent, as shown in Table 1, and the coating material constituent was obtained. The performance test result of the obtained paint film is shown in Table 2.

[0017]

[The example 2 of a comparison] As shown in Table 1, using the carbon fiber (Osaka Gas Co., Ltd. make, DONAKABO S-241) 4 weight section with an average die length [ of 0.13mm ], and a diameter of 13 micrometers, it mixed by the same approach as an example 1, and the coating material constituent was obtained. The performance test result of the obtained paint film is shown in Table 2.

[0018]

[The example 3 of a comparison] As shown in Table 1, 10 weight sections and the amount of dispersants were made into 10 weight sections, the amount of defoaming agents was made into 2 weight sections for the 180 weight sections and the amount of carbon fibers, the amount of zinc oxides was mixed by the same approach as the example 2 of a comparison, and the coating material constituent was obtained. The performance test result of the obtained paint film is shown in Table 2.

[0019]

[The example 4 of a comparison] As shown in Table 1, the dispersant was used as the special denaturation poly AMAIDO system dispersant (Kusumoto formation shrine make, Despa Ron DA- 400 Ns), and also it mixed by the same approach as an example 3, and the coating material constituent was obtained. The performance test result of the obtained paint film is shown in Table 2.

[0020]

[The example 5 of a comparison] As shown in Table 1, the defoaming agent was used as the defoaming agent (Kusumoto formation shrine make, Despa Ron 230) of a special AKURIRURU system, and also it mixed by the

same approach as an example 3, and the coating material constituent was obtained. The performance test result of the obtained paint film is shown in Table 2.

[0021]

[The example 6 of a comparison] As shown in Table 1, the defoaming agent was used as the defoaming agent (the Dow Corning make, pane DAT S) of a silicon system, and also it mixed by the same approach as an example 3, and the coating material constituent was obtained. The performance test result of the obtained paint film is shown in Table 2.

[0022]

[Table 1]

|                           |                            | 実 施 例 |     |     | 比 較 例 |     |     |     |     |     |
|---------------------------|----------------------------|-------|-----|-----|-------|-----|-----|-----|-----|-----|
|                           |                            | 1     | 2   | 3   | 1     | 2   | 3   | 4   | 5   | 6   |
| エポキシ樹脂                    |                            | 100   | 100 | 100 | 100   | 100 | 100 | 100 | 100 | 100 |
| 酸化亜鉛 (PZ) (3 ~ 6 $\mu$ m) |                            | 100   | 80  | 120 | 100   | 100 | 180 | 120 | 120 | 120 |
| 着色顔料                      |                            | 20    | 20  | 20  | 20    | 20  | 20  | 20  | 20  | 20  |
| 硬化剤：変性脂肪族ポリアミン            |                            | 40    | 40  | 40  | 40    | 40  | 40  | 40  | 40  | 40  |
| 炭素繊維                      | 0.7 mm, $\phi$ 13 $\mu$ m  | 4     | —   | 2   | 4     | —   | —   | 2   | 2   | 2   |
|                           | 3 mm, $\phi$ 13 $\mu$ m    | —     | 5   | —   | —     | —   | —   | —   | —   | —   |
|                           | 0.13 mm, $\phi$ 13 $\mu$ m | —     | —   | —   | —     | 4   | 10  | —   | —   | —   |
| 分散剤                       | ポリエステル酸の7717シ 系            | 2     | 3   | 1   | —     | 2   | 10  | —   | 1   | 1   |
|                           | 特殊変性ポリアミド系                 | —     | —   | —   | —     | —   | —   | 1   | —   | —   |
| 消泡剤                       | 特殊変性ビニル系                   | 2     | 3   | 1   | —     | 2   | 2   | 1   | —   | —   |
|                           | 特殊アクリル系                    | —     | —   | —   | —     | —   | —   | —   | 1   | —   |
|                           | シリコン系                      | —     | —   | —   | —     | —   | —   | —   | —   | 1   |

[0023]

[Table 2]

| 試 験 項 目               |          | 実 施 例 |     |     | 比 較 例 |      |     |     |     |     |
|-----------------------|----------|-------|-----|-----|-------|------|-----|-----|-----|-----|
|                       |          | 1     | 2   | 3   | 1     | 2    | 3   | 4   | 5   | 6   |
| 表面漏洩抵抗値 (M $\Omega$ ) |          | 0.2   | 0.5 | 0.8 | 2.5   | >100 | 100 | 1.0 | 1.0 | 1.2 |
| 塗膜外観                  | 着色性      | ○     | ○   | ○   | △     | ○    | ×   | ○   | ○   | ○   |
|                       | 表面平滑性    | ○     | ○   | ○   | ○     | ○    | ×   | ○   | ○   | △   |
|                       | 脱泡性      | ○     | ○   | ○   | ×     | ○    | ○   | ○   | △   | ×   |
|                       | 炭素繊維の分散性 | ○     | ○   | ○   | ×     | ○    | ○   | △   | △   | △   |

[0024]

[Effect of the Invention] While conductivity is securable with the loadings from which sufficient resistance was not acquired if respectively independent by mixing two kinds of conductive fillers in order that the constituent of this invention may give conductivity, thereby, only by the carbon fiber, the coloring made impossible is attained and the paint film which is excellent in smooth nature and is glossy is obtained.

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**CLAIMS**

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[Claim(s)]

[Claim 1] In the coating material constituent for conductive floors which consists of an epoxy resin, a conductive zinc oxide, a carbon fiber, a coloring agent, a dispersant, a defoaming agent, and a curing agent As opposed to the epoxy resin 100 weight section of weight per epoxy equivalent 150-300 The carbon fiber 0.5 whose average die length is the conductive zinc oxide 50 with a particle diameter of 2-20 micrometers - the 150 weight sections and whose average diameter is 0.3-3mm in 10-20 micrometers - 6 weight sections, The coating material constituent for conductive floors characterized by containing the AMAIDO amine system dispersant 0.1 of a polyester acid - 5 weight sections as a dispersant, and containing the defoaming agent 0.1 of a special denaturation vinyl system polymerization object - 5 weight sections as a defoaming agent.

[Claim 2] Conductive flooring characterized by having a constituent according to claim 1 in a part of enveloping layer [ at least ].

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[Translation done.]